WHAT IS CLAIMED IS:

1. A process for producing a linear α-olefin which comprises:

reacting a feed comprising a stoichiometric excess of a terminal C_n olefin with ethylene in the presence of an organometallic catalyst to produce a C_{n+2} linear α-olefin, wherein said catalyst is capable of producing a Schulz-Flory of less than about 0.8 as observed for ethylene oligomerization and wherein n is an integer between about 3 to 20.

2. The process according to claim 1, wherein said terminal olefin is selected from the group consisting of C_3 to C_{20} olefins.

3. The process according to claim 2, wherein said terminal olefin is at least one selected from the group consisting of: propylene, 1-butene,1-pentene, 1-hexene, 1-heptene and 1-octene and mixtures thereof.

4. The process according to claim 1, wherein said linear α-olefin is selected from the group consisting of: C_5 to C_{22} linear α-olefins.

5. The process according to claim 4, wherein said linear α-olefin is selected from the group consisting of: C_6-C_{10} linear α-olefins.

6. The process according to claim 1, wherein said reaction step is conducted at a temperature in the range from about -100 to about 250°C.

7. The process according to claim 1, wherein said temperature is in the range between about room temperature to about 100°C.

8. The process according to claim 1, wherein said reaction step is conducted at a pressure from about 0 to about 30,000 psig.

9. The process according to claim 1, wherein said pressure is in the range from about 0 to about 10,000 psig.

10. The process according to claim 1, wherein said pressure is in the range from about 5 to about 3,000 psig.

11. The process according to claim 1, wherein said terminal olefin to ethylene molar ratio is in the range between about 2:1 to about 1,000:1.

12. The process according to claim 1, wherein said terminal olefin to ethylene molar ratio is in the range between about 10:1 to about 100:1.

13. The process according to claim 1, wherein said reaction step is a catalytic coupling of said terminal olefin and said ethylene to form said linear α-olefin.

14. The process according to claim 1, wherein said reaction step is performed in the presence of a solvent.

15. The process according to claim 14, wherein said solvent is selected from the group consisting of: ethane, propane, butane, pentane, hexane, toluene, cyclohexane, cyclopentane, tetralin, methylene chloride, chlorobenzene, chloroform, o-dichlorobenzene, carbon dioxide and mixtures thereof.

16. The process according to claim 1, wherein said organometallic catalyst is a transition metal-based catalyst selected from the

group consisting of: Group 6 metals, Group 8 metals, Group 9 metals, Group 10 metals, Group 11 metals or mixtures thereof.

17. The process according to claim 16, wherein said transition metal-based catalyst is a catalyst selected from the group consisting of: chromium trimerization catalysts, Brookhart type transition metal catalysts, pyridine bisimine iron or cobalt complexes, NiBBIM catalysts, Ni-thiolene catalysts and SHOP catalysts.

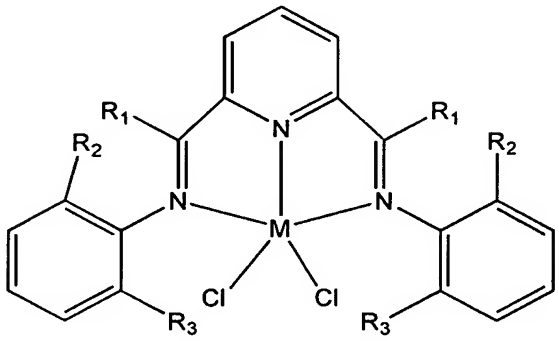
18. The process according to claim 17 wherein said transition metal-based catalyst further comprises an activator.

19. The process according to claim 17 wherein said transition metal-based catalyst is a supported catalyst.

20. The process according to claim 19 wherein said supported catalyst is a silica supported catalyst.

21. The process according to claim 17, wherein said NiBBIM catalyst has the formula $LMX(X')_n$ wherein n equals 0 or 1; X and X' are independently selected from the group consisting of halides, hydride, triflate, acetates, borates, C_1 through C_{12} alkyl, C_1 through C_{12} alkoxy, C_3 through C_{12} cycloalkyl, C_3 through C_{12} cycloalkoxy, aryl, thiolates, carbon monoxide, cyanate, olefins, and any other moiety into which a monomer can insert; M is selected from the group consisting of nickel, palladium, and platinum and L is a nitrogen-containing monodentate, bidentate, tridentate or multidentate ligandwith one or more nitrogen atoms.

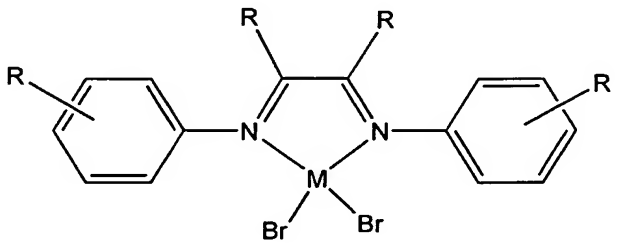
22. The process according to claim 17, wherein said pyridine bisimine iron or cobalt complex is a Fe(II)-pyridine bisimine or Co(II)-pyridine bisimine complex having the formula



where R1, R2, and R3 are each independently selected from the group consisting of hydrogen, halogen, hydrocarbyl, substituted hydrocarbyl, heterohydrocarbyl, and substituted heterohydrocarbyl.

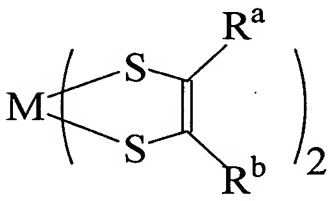
23. The process according to claim 22 wherein said pyridine bisimine iron or cobalt complex is a Fe(II)-pyridine bisimine or Co(II)-pyridine bisimine complex is selected from the group consisting of 2,6-bis[1-(2-methylphenylimino)ethyl]pyridyliron (II) chloride: 2,6-bis[(2-methylphenylimino)methyl]pyridyliron(II)chloride; and mixtures thereof.

24. The process according to claim 17, wherein said Brookhart type transition metal catalyst is a catalyst having the formula



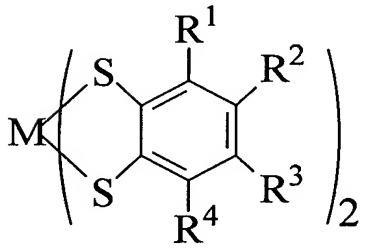
Where M is Ni or Pd and each R is independently selected from hydrogen, haologen, hydrocarbyl, substituted hydrocarbyl, heterohydrocarbyl and substituted heterohydrocarbyl.

25. The process of claim 17 wherein said Ni-thiolene catalyst is selected from the group of catalysts consisting of a catalyst having the formula



$M[S_2C_2(R^aR^b)]_2$

(I)



$M[S_2C_6(R^1R^2R^3R^4)]_2$

(II)

wherein M is a transition metal selected from the group consisting of Fe, Co, Ni, Pd or Pt and R^a and R^b may be the same or different, and are independently selected from hydrogen, electron-withdrawing groups including those that are or

contain heterocyclic, cyano, carboxylate, carboxylic ester, keto, nitro, and sulfonyl groups, and hydrocarbyl groups, including unsubstituted, fully, or partially substituted alkyl, cyclo alkyl, alkenyl and aryl groups.

26. The process of claim 24 wherein R^a and R^b are cyano groups, and halo substituted groups.

27. The process according to claim 17, wherein said SHOP catalyst is selected from neutral Ni(II) complexes bearing bidentate monoanionic ligands.

28. The process according to claim 1, wherein the process is either a continuous, semi-continuous or batch type process.

29. The process of claim 26 wherein said cyano groups are CN groups and said halo substituted groups are CF_3 groups.